Date.	Catalogue No. of Stars.		½ (δ + δ′).			Micrometer Correction.		Level Correction.	Latitude.
1883.									
2 mo. 5.	489	495	39	58	56.523	+ 1	12.567	+ 31.815	39·91
"	530	550	39	59	56.002	+	21.5061	+ 22.68	43.19
"	567	569	40	6	19.803	— 6	5.969	+ 23.153	36.99
2 mo. 8.	466	475	40	10	44.976	— 10	11.925	+ 3.78	36.83
"	467	475	40	12	12.959	— 11	37.301	+ 3.78	39.44
"	489	495	39	58	55.198	+ 1	41.325	+ 3.15	39.67
"	530	550	39	59	56.306	+	43 75	+ 0.787	40.84
"	567	569	40	6	20.131	— 5	43.5889	+ 3.15	39.70
"	577	591	39	51	35.175	+ 9	9.149	— 3.44	40.88
"	578	591	40	5	10.217	— 4	27.16	+ 3.44	39.62
2 mo. 9.	466	475	40	10	44.976	— 9	9.373	+ 7.56	43.16
"	489	495	39	58	55.198	+ 1	40.150	+ 3.44	38.79
"	567	569	40	6	20.1325	— 5	45.9948	+ 7.245	41.38
"	682	710	39	56	19.1645	+ 4	13.733	+ 6.3	39.20
"	697	710	39	54	34.2665	+ 6	1.493	+ 6.3	42.46
2 mo. 12.	466	475	40	10	44.041	— 9	46.635	+ 7.56	41.97
"	489	495	39	58	55.782	+ 1	33.014	+ 6.615	35.43
"	530	550	39	59	56.5965	+	41 1792	+ 3.15	40.84
"	567	569	40	6	20.3575	— 5	43.309	+ 2.3625	39.41
"	578	591	40	5	4.822	— 4	29.769	+ 2.677	37.73
"	697	710	39	54	34.5405	+ 6	10.165	+ .945	45.65
2 mo. 13.	466	475	40	10	44.041	— 10	13.547	+ 6.15	37.11
"	567	569	40	6	20.3575	— 5	34.0215	— 9.135	37.20
"	697	710	39	54	34.5405	+ 6	22.1385	— 14.49	42.18
2 mo. 23.	530	550	39	59	57.113	+	44.928	+ .787	42 83
"	753	757	39	56	7.521	+ 4	37.368	— 4.882	40.01
2 mo. 27.	530	550	39	59	57.031	+	44.20	+ 3.1	44.33
3 mo. 8.	812	822	39	54	18.609	+ 6	28.125	— 2.047	44.69
3 mo. 13.	779	812	40	0	26.399	+	3.357	+ 11.496	41.27
"	779	834	39	53	53.759	+ 6	35.276	+ 11.025	40.06
"	779	859	39	56	43.715	+ 3	47.381	+ 7.718	38.81
3 mo. 14.	812	822	39	54	19.105	+ 6	24.096		43.20

The mean of these 76 results gives the latitude of the Observatory

40° 0′ 40.085.

Assuming them all to be of equal weight, the probable error of a single observation is 1.706″ and of the final result .191″.

NOTE.—The value of the longitude of the Observatory, standing on our books, but obtained, we do not know how, is 6m. 59.3 sec. East of Washington. At the time of the Transit of Venus, Washington time was telegraphed to our railroad station, distant one-half mile from the Observatory and compared with our local time. The mean of three days' comparisons gave a difference of 6m. 59.6 sec.

On a Crinoid with Movable Spines. By Henry S. Williams.

(Read before the American Philosophical Society, April 20, 1883.)

Among the rarer forms of the second fauna of the upper Devonian, at the base of the Chemung group, Ithaca, N. Y., is a Crinoid with some interesting features.

In its general characters it agrees with the family *Platycrinidæ* of Rœmer, and falls under the section *Hexacrinites* as defined by Wachsmuth and Springer in Revision of the Palæocrinoidea, Pt. II, p. 56.

It differs from the genus *Hexacrinus* Austin, as generally understood, in possessing a well defined third primary radial similar in size to the second, and from which the free arms abruptly diverge.

In respect of one character it differs fundamentally from all the known representations of the genus, section or family; and, in fact, from all hitherto described Crinoids, in the possession of slender, acicular spines which were free from the plates, and were evidently articulated by some means upon elevated pitted tubercles on the surface of the plates of the calyx, vault and free arms.

We find so-called spines on a few Crinoids, on the plates of the vault in the genera Dorycrinus and Amphoracocrinus, and upon the calyx plates of Rhodocrinus and other genera.

In all these cases, however, the "spines" or tubercles consist merely of thorn-like expansions of the plates, and, so far as I can learn, there is no recorded evidence of the occurrence upon any true Crinoid, of free spines articulated to the plates as in the Echinoids.

In the absence of the spines themselves, the low rounded tubercles, pitted at the apex, suggest resemblance to the mamelon of the Echinoids, but in the specimens herein described, the spines as well as the tubercles are represented.

Other specimens have been examined in which the pitted tubercles alone are seen; the spines have been found in only a single locality, but there upon several individuals.

These specimens, like most of the fossils of the fine sandy shales of the upper Devonian, are in the condition of hollow impressions preserving scarcely a particle of the original substance of the test, but the impressions are beautifully perfect, showing the finest details of surface marking and configuration. On the impressions of some of the slender spines, fine longitudinal striæ, invisible to the naked eye, are distinctly seen with a good lens.

Palæontologists accustomed to throw aside these hollow impressions of fossils in the Chemung rocks, as poor and worthless specimens, will be surprised at the perfection in which all the surface details, external and internal are preserved.

Many minute characters are visible in such specimens that are rarely seen in so called perfect specimens from limestone rocks, where the immediate surface is very generally removed in taking the fossil from the matrix.

In the present case the specimens break along the cavities from which the test has been dissolved, the inner and outer surfaces of the plates both appearing, and the spines in place. That they were true spines, and not prolongations of the plate surface is evidenced by the fact that the spines, though in place, like bristles radiating from the surface, are in no case entirely continuous with the impressions left by the removal of the plate; there is always a thin film of matrix separating the base of the spine from the apex of the tubercles, to which in several cases they are closely approximate.

When the spines are preserved in relation to the vault, although the specimen was crushed and thrown out of normal shape, the vault plates and their spines were held together during the process of fossilization.

The evidence is such as to suggest that the spines were united to the plates by a tough ligamentous attachment which withstood decomposition long after the fossil was buried.

The calyx plates were thin and frequently occur detached, but the basal plates were thickened toward the center of the disk where they joined the column, and were generally preserved together, though separate from the rest of the calyx.

In studying this genus, I have examined several specimens which agree with the typical form in the general character of the plates and the arms in one case, and possess the pitted tubercles on the surface.

The most important among these is the original specimen of a figure issued by the New York State Museum with the name *Platycrinus? punctobrachiatus.*

The original is in the Museum of Cornell University. The name was proposed by Prof. Hall, but, as he informs me, the species was never described. This, with several other undescribed species, was photographed and the plate was privately distributed abut 1872, with names attached, but with no descriptions. The arms, the shape of calyx, and the plates that were preserved, correspond in general with the *A. Ithacensis,* but the tubercles on the calyx plates are finer, more numerous, and the pitting very indistinct, and the basal plates are relatively larger than in the typical specimens of that species. Hence we are led to believe that the Hamilton species is distinct from the Chemung specimens, and even if it were properly described and published, it is probably safe to regard it as a distinct species. Although the specimen shows no traces of the free spines, the nature of the tubercles leave little doubt of a generic identity with *Arthroacantha Ithacensis,* and the Hamilton form may be called *Arthroacantha punctobrachiata.*

In the Museum of Cornell University are two specimens, each a portion of the basal disc, which appear to be identical with *A. punctobrachiatus.*

One is marked *Moscow shale,* locality not designated ; the other is marked *Hamilton Period, Delphi, N. Y.*, and is on a soft dark shale with specimens of *Pholidops.*

Another specimen, generically identical, but too imperfect for specific determination, is in the collection of Prof. S. G. Williams, from the Hamilton group at Ensinore Glen, Owasco lake, N. Y.

Dr. Charles Wachsmuth of Burlington, Iowa, informs me of having examined specimens of apparently the same species, said to have come from Hamilton group, Ontario, Canada.

A single calyx plate from High-point, Ontario Co., N. Y., has large, coarse tubercles, and the plate is evidently from a much larger specimen than any seen at Ithaca, or in the Hamilton group, it is probably a distinct species.

A few detached calyx plates with similar surface markings, but proportionately longer and narrower than those of *A. Ithacensis*, were found in another exposure of the rocks near Ithaca.

The tubercles were few and scattered, this may represent another species. The generic characters of this new type of Crinoid may be defined as follows :

Arthroacantha, nov. gen.

(From 'άρθρον, articulation and 'άκανθα spine.) Calyx obconical or broadly cup-shaped ; height about equal to the breadth. Basal disc broad, shallow, hexagonal, composed of three subequal plates.

Following the basal disc are six large subequal plates, five of which are primary radials, and the sixth is the anal.

The first radials are slightly higher than broad with gently diverging sides, the upper margin excavated by a deep covered notch occupying about one third the total width of the upper edge.

In this notch lie the second radials, small and short plates which arch outward and continue upward the rounded carination that begins on the upper part of the first radial.

The third radial is triangular, smaller than the second and supports the first plates of the free arms which start out from the radial at a broad angle.

The arms are ten, and, in the typical species are several times as long as the height of the calyx, and bifurcate at least twice, and broadly diverge at each branching.

They are composed of plates which are narrowly wedge-shaped at the base of the arm, the first two or three reach across the breadth of the arm, but seriatim they become shorter, the wedge points more blunt, and the outer portion of the margin more nearly parallel, and for the main part of the arm the plates interlock along the median line, forming a zigzag suture, the points of the plates from each side reaching less than two-thirds across the surface of the arm.

Each arm plate bears a slender pinnule of five or more joints.

The anals are a little narrower than the first radials, and have less diverging sides.

The vault is composed of numerous small plates, and was probably low and arching.

The surface of the calyx plates is beset with low scattered, rounded tubercles, pitted at the apex.

The same tubercles are seen on the plates of the vault, a single tubercle for each plate.

Upon the vault there are five narrow spaces, without tubercles, radiating from the center; they consist of two rows of interlocking plates which were probably thinner than the spine-bearing plates; all the intervening plates have tubercles.

Along the upper rim of the calyx is a row of small plates which lack the tubercles ; also, the tubercles are wanting on the second and third radial plates. The arm plates pretty generally have a small tubercle for each plate, but there is an occasional exception.

From these tubercles proceed slender, acicular spines, bristling outward from the calyx and arms, and upward from the vault.

These spines were evidently movable, and articulated by ? ligaments or ? muscle upon the pitted tubercles. The spines are also pitted at their bases.

The typical species, *A. Ithacensis*, is from the base of the Chemung group at Ithaca, N. Y., from a fine, sandy shale, containing *Spirifera mesocostalis*, *Productella speciosa*, *Strophodonta mucronata*, and other Chemung fossils, and the specimens are in the museum of Cornell University.

Arthroacantha Ithacensis, n. s.

This name is proposed for the typical species upon which the genus *Arthroacantha* is founded, and the imperfection of the material and the actual variation among the few specimens seen create considerable doubt as to what may be the permanent characters which distinguish the typical form from other representatives of the genus. I will give therefore a particular account of the size and proportions of the parts of the typical specimens, and remark upon the variations observed.

The general shape and features are described in the generic diagnosis.

The typical species has the following dimensions:

	MM.	
Calyx, height	9.5	
breadth	13.5	
Arms, thickness at base	1.4	
estimated length	45.0	
Stem, thickness at junction with calyx	1.9	
Basal, radius from center of disc to base of 1st radial	4.5	
1st radial, height	4.5	
2d and 3d radials together	1.1	
1st radial, width at base	5.0	
" " top	7.0	
Tubercles, diameter about	0.6	
number on one basal plate		16–18
" " one 1st radial		21
Spines, length of longest	12.8	
diameter at base	0.4	

The arms have ten to fifteen joints before they bifurcate. The calyx plates are marked on the inside by several distinct lines parallel with each other and with the outline of the plate, arranged concentrically like lines of growth. This feature is not seen on the specimens from the Hamilton group.

There is considerable difference in size among the several specimens from the typical locality, though the majority of specimens are about the dimensions given above. A large basal disk is seen with a radius of 12.2 mm., but with proportions of the other specimens.

Although the specimens show more or less distortion from pressure, it is evident that the basal disk formed a low shallow cup, the depth of which was about one-quarter the diameter.

The length of spines vary for the same individual. Those within the protection of the arms, from the vault plates, are more frequently preserved, and are longer than representatives of calyx spines seen on these specimens, but one calyx spine is thicker than any vault spine, and is broken off; judging from this and the larger size of the tubercles, it is probable that the calyx spines were fully as long and strong as those on the vault. The spines are all very straight, slender, acicular, tapering evenly to a sharp point, and are finely longitudinally striate on the surface.

The number of the tubercles to each plate varies somewhat, and, comparing specimens of different size, it seems probable that their distribution was uniform, and that the number increased with the size of the specimen.

This species differs from the *Arth. punctobrachiata* of the Hamilton group in the more distinct and less numerous tubercles on the surface of the calyx plates ; the smaller size of the tubercles leads to the inference that the spines were smaller in the Hamilton form ; the calyx plates were apparently thicker in the Chemung species, and the second and third radial of the specimen *Arth. punctobrachiata* are higher than those of *Arth. Ithacensis.*

In all these comparisons normal variation (of which we are ignorant), the effects of different habitat upon relative development of parts, and the distortion incident to fossilization, and the very limited and imperfect nature of the material, lead us to speak with diffidence both as to specific character and as to specific limits.

The character of movable spines, were it not so anomalous for the whole order, might be regarded as of only specific value ; on the other hand, from a theoretical point of view it would not be unreasonable to establish a distinct family for Crinoids possessing this Echinoid character.

I have taken the view that for practical purposes the generic distinction of this from closely related genera is the best that can be done with the present material.

The character of a vault composed of two sets of plates arranged in ten radiating and alternate series is suggestive, and calls for further investigation.

I have discovered on one of the specimens—somewhat crushed, but exhibiting the main part of the vault and spines in place—five radiating rows of plates upon which there are no tubercles. In crushing, the folding has taken place along the line of these rays, from which it is inferred that these plates were thinner than the spine-bearing plates which fill the spaces between them. These smooth plates seem to consist of two rows

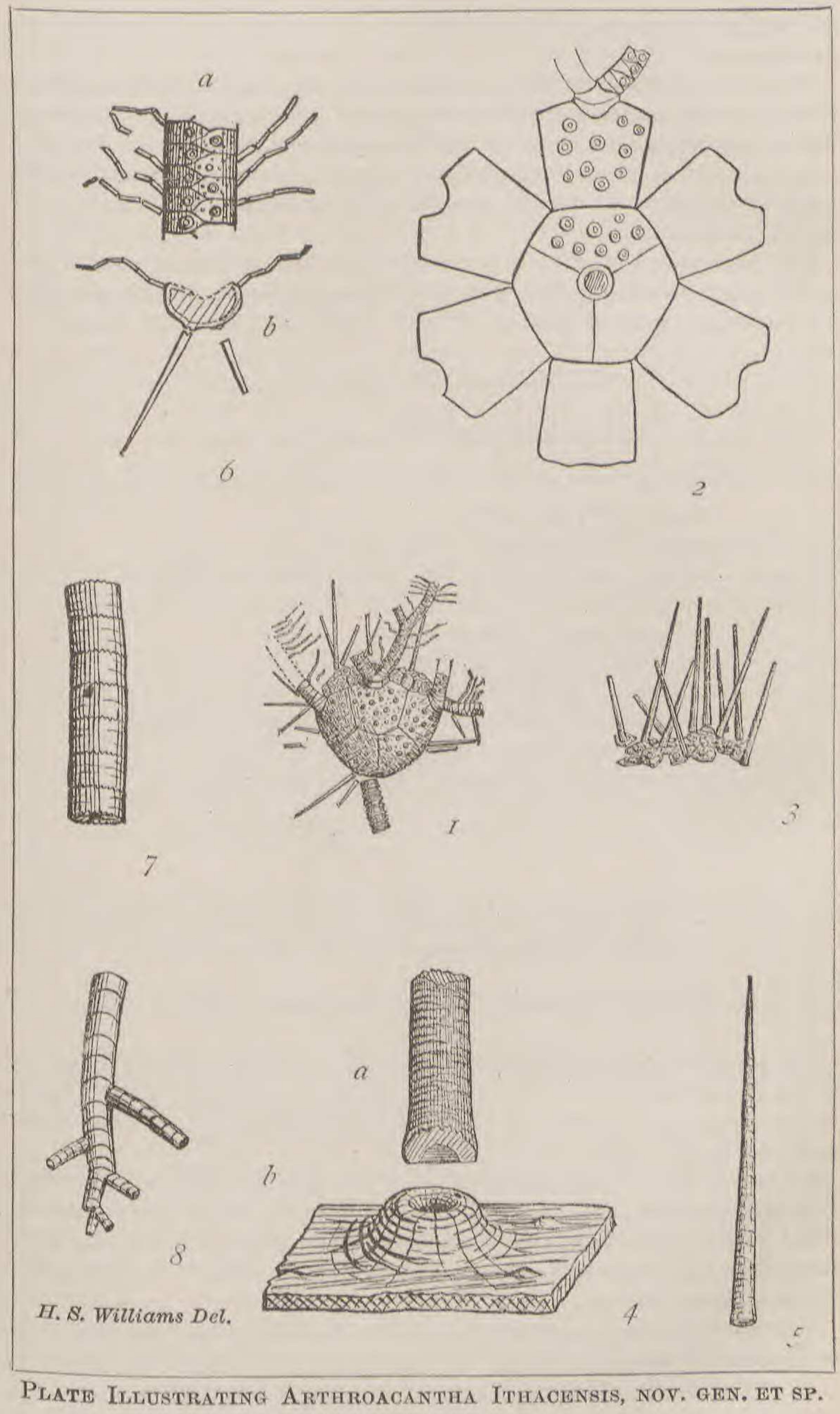

PLATE ILLUSTRATING ARTHROACANTHA ITHACENSIS, NOV. GEN. ET SP.

of interlocking plates radiating from near the center to the circumference of the vault.

This observation persuades me that it is not improbable that the original plates of *Lepidocentrus eifelianus*, described and figured by Johannes Müller, from the Eifel limestone of Rommersheim, which were detached plates associated with spines similar in nature to those just described and borne upon similar tubercles, were plates from the vault of a true Crinoid like Arthroacantha.

We have here a possible clue to a relationship between true Crinoids and Perischœchinidæ, which is worth following up by any palæontologist who may have good specimens of these rare forms of Echinodermata.

EXPLANATION OF PLATE.

Arthroacantha Ithacensis, nov. gen. et sp.

Fig. 1.—Calyx and part of arms, showing spines arising from plates of calyx, vault and arms.

Fig. 2.—Diagram of the elements of the calyx.

Fig. 3.—Enlarged view of part of the vault with spines attached.

Fig. 4.—Enlarged tubercle (*b*) and base of a spine (*a*), showing pit in top of former and in base of latter.

Fig. 5.—Spine about three times natural size.

Fig. 6.—Arm-plates. (*a*) A few joints of arm; external view, showing tubercles and jointed pinnules. (*b*) Section of same.

Fig. 7.—Section of the stem at a distance from the calyx.

Fig. 8.—Lower termination of stem. All enlarged except Fig. 1.

The Role of Parasitic Protophytes. Are they the Primary, or the Secondary Cause of Zymotic Diseases? By W. N. Lockington.

(*Read before the American Philosophical Society, April 6, 1883.*)

Parasitic unicellular organisms or microbes, usually considered to belong to the vegetable kingdom, are found, in some form or other, in the interior of the higher animals, both when in their normal state of health, and when suffering from disease.

Certain rod-like forms have received the generic name of *Bacillus*; spherical globules that of *Micrococcus*, while other shapes have been entitled *Vibrio*, *Bacterium*, and *Cladothrix*. The idea of those who gave these titles was evidently that each of these forms is actually distinct under existing circumstances.

Nomenclature has even proceeded farther than this, since such binomials as *Bacillus anthracis* exist.